

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1 Claim 1 (currently amended): A keep-warm system to
2 provide freeze protection for a fuel cell power plant
3 (10),
4 comprising:
5 a. a fuel cell stack assembly (CSA) (12)
6 including an anode (16), a cathode (18), an
7 electrolyte (14), and a cooler (20);
8 b. fuel supply means (25) for providing a supply
9 of fuel, at least some of the fuel being supplied as
10 reactant to the anode (16);
11 c. a source of oxidant reactant (22) operatively
12 supplied to the cathode (18);
13 d. a water management system (30, 28)
14 operatively connected to the cooler (20) of the CSA
15 (12);
16 e. thermal insulating means (64) enclosing at
17 least one of the CSA (12) and the water management
18 system (30, 28) for providing thermal insulation
19 thereof; and
20 f. catalytic fuel burner means (66)
21 operatively connected to the fuel supply means (25)
22 and to the source of oxidant reactant (22) for
23 catalytically reacting the fuel and oxidant and
24 providing a source of heat, the burner means (66)
25 being disposed and operative to supply heated gas into
26 the thermal insulating enclosure means (64), and to the
27 at least one of the CSA (12) and the water management
28 system (30, 28) in the thermal insulating enclosure

29 means (64), thereby to prevent freezing of water in
30 freeze-sensitive parts of the fuel cell power plant.

1 Claim 2 (original): The keep-warm system of claim 1
2 wherein the catalytic burner means (66) includes a
3 catalytic surface (72) for combustively reacting the
4 fuel in the presence of oxidant in a flameless manner
5 to release heat only in a thermal range less than about
6 1000⁰ F.

1 Claim 3. (original): The keep-warm system of claim 2
2 wherein the heat released by catalytic combustion at
3 the catalytic burner means (66) is in the thermal range
4 of about 200⁰-700⁰ F.

1 Claim 4. (original): The keep-warm system of claim 2
2 wherein the source of oxidant reactant (22) is ambient
3 air, the air being supplied to the catalytic burner
4 means (66) and mixed with fuel from the fuel supply
5 means (25) for combustively reacting the mixture in the
6 presence of the catalytic surface (72) to release heat.

1 Claim 5. (original): The keep-warm system of claim 1
2 wherein the fuel supply means (25) comprises a
3 container of hydrogen stored under pressure.

1 Claim 6. (original): The keep-warm system of claim 1
2 wherein both the CSA (12) and the water management
3 system (28, 30) are substantially enclosed by the
4 thermal insulating means (64).

1 Claim 7. (original): The keep-warm system of claim 4
2 wherein the electrolyte (14) of the CSA (12) is a
3 proton exchange membrane (PEM), the fuel from the fuel

4 supply means (25) is hydrogen, and the heat released by
5 catalytic combustion at the catalytic burner means (66)
6 is in the thermal range of about 200° - 700° F.

1 Claim 8. (currently amended): In a fuel cell power
2 plant (10) having a fuel cell stack assembly (CSA) (12)
3 including an anode (16), a cathode (18), and an
4 electrolyte (14), ~~and a cooler (20)~~, a fuel supply (25)
5 for providing fuel to at least the anode (16), a source
6 of oxidant reactant (22) for supplying at least the
7 cathode (18), and a water management system (30, 28)
8 operatively connected to the ~~cooler (20) of the CSA~~
9 (12), the method of preventing freezing of water in
10 freeze-sensitive parts of the fuel cell power plant
11 (10) during shutdown, comprising the steps of:

12 g. selectively flowing (62, 63, 69, 67) fuel (25)
13 and oxidant (22) to a catalytic fuel burner (66) during
14 shutdown for catalytic combustion to provide heated
15 gas;

16 h. convectively flowing the heated gas into heat
17 transfer relation with the freeze-sensitive parts of
18 the fuel cell power plant (10) to provide heat thereto;
19 and

20 i. thermally insulating the freeze-sensitive
21 parts of the fuel cell power plant (10) including the
22 heated gas flowing in heat transfer relation therewith.

1 Claim 9. (new): The method of claim 8 wherein the step
2 of selectively flowing fuel and oxidant to a catalytic
3 fuel burner provides heated gas in a thermal range of
4 about 200° - 700° F.

1 Claim 10. (new): The method of claim 8 wherein the step
2 of thermally insulating the freeze-sensitive parts of

3 the fuel cell power plant (10) comprises thermally
4 insulating both the CSA (12) and the water management
5 system (28, 30).